

Remarks

This is in response to the Office Action mailed November 24, 2006. All rejections are respectfully traversed. Claims 1, 3-14, and 16 are pending in the Application. Claims 2, 15 and 17 are cancelled. Claims 1 and 16 are amended herein.

Double Patenting

The Examiner provisionally rejected claims 1, 2, 10 and 16 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1 and 12 (amended 9/6/06) of copending Application No. 10/388,925. Applicant requests that the provisional double patenting rejections be held in abeyance until patentability of the claims on statutory grounds has been established.

Rejections Under 35 U.S.C. §103

The Examiner rejected claims 1, and 3-14 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,297,844 to Schatz (hereinafter "Schatz") in view of U.S. Patent Application Publication No. 2004/00179929 to Bramblet (hereinafter "Bramblet") and further in view of Jain et al., Machine Vision, MIT Press and McGraw-Hill Inc., 1995 (hereinafter "Jain").

Claim 1 representative in part of the other rejected claims recites:

1. A method of controlling an object's motion through a viewed space comprising the steps of:
 - acquiring a stereo image of said viewed space wherein said stereo image comprises an image set;
 - computing a set of 3D features from said stereo image;
 - filtering from said set of 3D features to generate a set of filtered 3D features;
 - computing a trajectory of said set of filtered 3D features; and
 - generating a control signal influencing said object's motion in response to said trajectory;

wherein said step of computing a set of 3D features comprises the steps of:

edge-processing said stereo image to generate a plurality of connected edgelets;

identifying connected edgelets having length greater than a predetermined threshold as features;

matching **features** to generate disparities generated from different images in said image set; and

computing 3D locations of feature points according to at least said disparities.

Schatz discloses deriving 3D features using any of several well known segmentation processes (col. 7, lines 38-39) and using trajectory computations to generate alarm conditions (col. 10, lines 36-39). Bramblet discloses machine vision methods including electronic access control. (Abstract.) Applicants respectfully submit that Schatz and Bramblet alone or combined are silent regarding “computing a set of 3D features... wherein the step of computing a set of 3D features comprises ... identifying connected edgelets having a length greater than a predetermined threshold as features...[and] matching features to generate disparities...” as particularly claimed.

Applicant respectfully submits that, contrary to the Examiner’s characterization, the well known segmentation process described by Schatz is not a process for filtering connected edgelets. Rather, segmentation as described by Schatz is performed after the 3D points have been generated and 3D features have been generated from the 3D data points for the purpose of segmenting the 3D points into objects. Such segmentation does not read on “edge-processing said stereo image to generate a plurality of connected edgelets” as particularly claimed.

Furthermore, although the Examiner asserted that Schatz discloses “computing a set of 3D features from said stereo image” the Examiner also admitted that “Schatz and Bramble fail to specifically disclose filtering out edges that have a length less than a threshold...” (Office Action p. 5, lines 12-13). The Examiner also admitted that “Schatz and Bramble further fail to specifically disclose matching features in the two images in the stereo image to generate disparities and computing 3D locations of feature points according to the disparities and camera geometry” (Office Action p. 5, line 21 – p 6. line 1). Applicants submit that the Examiner’s assertion that Schatz discloses “computing a set of 3D features from said stereo image” is erroneous because, as the Examiner admitted, Schatz and Bramble do not disclose the filtering and matching steps that are components of the computing step of claim 1, and because the question to be answered under 35 U.S.C. 103 “is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious” Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983).

The Examiner took Official Notice that it was extremely well known in the art to filter out edges in an edge segmentation algorithm that are shorter than a predetermined length. The Examiner asserted that “[t]herefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schatz by using an edge segmentation algorithm that filters out edges shorter than a predefined length... for the purpose of eliminating edge noise caused by certain segmentation algorithms, thereby decreasing the amount of processing performed when 3D features are generated (Office Action, p. 5, lines 14-21). Applicants respectfully request that the Examiner produce an authority for his statement in the content of taking Official Notice. Applicants submit that the noticed fact does not render the claim language to be common

knowledge or well-known in the art because the claim language does not simply require filtering out edges shorter than a predefined length, but in the context of the claimed invention as a whole identifies filtered edgelets as features for the additional processing steps. Further, nothing in prior art known to Applicants teaches or suggests identifying connected edgelets having a length greater than a predetermined threshold as features within a process step of computing a set of 3D feature from a stereo image such as Applicants particularly claim.

The Examiner asserted that “Jain discloses... matching features from the two images in a stereo image in order to generate disparities and computing 3D locations of points based on the disparities and camera geometry...” The Examiner asserted that “[t]herefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Schatz and Bramblet, by providing for matching features in the two images in the stereo image to generate disparities and computing 3D locations.” (Office Action p. 6, lines 5-18). Applicants submit that Jain discloses stereo matching techniques for determining distance of various points in a scene relative to the position of the camera using disparities between binocular images (Jain p. 289). Jain further discloses that “[b]oth edge features and region features have been used in stereo matching.” (Jain p. 293). Jain does not teach or suggest anything about matching features to generate disparities, wherein the features are identified connected edgelets or wherein the features are edgelets greater than a predetermined threshold length, or wherein the edgelets upon which the features are based are generated by edge-processing a stereo image, as particularly claimed.

Applicants submit that the Examiner used impermissible hindsight in view of Applicants' disclosure to combine three references with improper taking of official notice of a particular filtering technique to erroneously assert that the claimed invention is obvious.

Applicants further submit that Jain teaches away from the claimed invention by describing edge matching methods which do not include "identifying edgelets having length greater than a predetermined threshold as features." Rather, Jain discloses: "1) Filter each image in the stereo pair with Gaussian filters...; 2) Compute edge positions within the row... 3) Match edges at coarse resolutions... 4) Refine the disparity estimates by matching at finer scales." (Jain, p. 294). There is no suggestion to combine if a reference teaches away from its combination with another source. "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant . . . [or] if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant." In re Gurley, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed.Cir. 1994). Applicants respectfully submit that a person of ordinary skill, upon reading Jain would be led in a direction divergent from the path that was taken by the applicant because she would use Gaussian filtering algorithms rather than "identifying connected edgelets having a length greater than a predetermined threshold as features" as Applicants particularly claim.

Since no combination of Schatz, Bramblet and Jain teaches or suggests each and every element of the rejected claims, and since persons having ordinary skill in the art would not be

motivated to combine Schatz, Bramblet and Jain without the benefit of impermissible hindsight, without substantially modifying those references and without ignoring express teachings to pursue a direction divergent from the path taken by applicant. Applicants respectfully submit that the rejection of claims 1 and 3-14 35 U.S.C. 103§(a) are improper and should be withdrawn.

For at least the reasons stated herein, Applicant's respectfully request reconsideration of the rejections. The absence of additional patentability arguments should not be construed as either a disclaimer of such arguments or that such arguments are not believed to be meritorious.

The Examiner rejected claim 16 under 35 U.S.C. §103(a) as being unpatentable over Schatz in view of U.S. Patent No. 6,963,661 to Hattori et al. (hereinafter "Hattori"). The Examiner rejected claim 17 under 35 U.S.C. §103(a) as being unpatentable over Schatz in view of Dhond et al., Structure from Stereo – A Review, IEEE Transactions on Systems, Man, and Cybernetics, vol. 19, no. 6, December 1989 (hereinafter "Dhond"). Applicants respectfully submit that Claim 16 is amended herein to include the steps of edge processing and identifying connected edgelets having length greater than a predetermined threshold as features. Applicant submits that claim 16 as amended herein is not obvious under 35 U.S.C. §103(a) for the reasons set forth above with regard to claim 1. Claim 17 is cancelled herein.

CONCLUSION

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such action is hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below. The Examiner is invited and encouraged to telephone the undersigned with any concerns in furtherance of the prosecution of the present application.

Please charge any deficiency as well as any other fee(s) which may become due at any time during the pendency of this application, or credit any overpayment of such fee(s) to Deposit Account No. 50-2896. Also, in the event any extensions of time for responding are required for the pending application(s), please treat this paper as a petition to extend the time as required and charge Deposit Account No. 50-2896 therefore.

Respectfully submitted,

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Dated:



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